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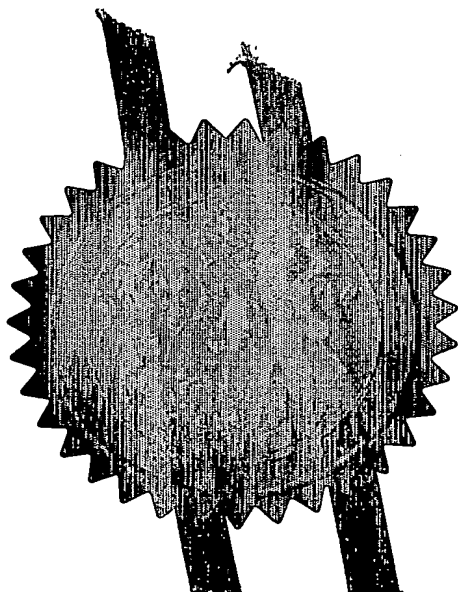
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1. Your reference P707114GB/DRC/48133

2. Patent application number

(The Patent Office)

28 JUN 2002

0215077.9

Name of the or of  
(underline all surnames)

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Patents ADP number (if you know it)

If the applicant is a corporate body, give the  
country/state of its incorporation

7553530001

4. Title of the invention Blending Apparatus

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom  
to which all correspondence should be sent  
(including the postcode)

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Goldings House  
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SE1 2HW

Patents ADP number (if you know it)

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6. If you are declaring priority from one or more  
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applications and (if you know it) the or each  
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Number of earlier application

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8. Is a statement of inventorship and of right to  
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- a) any applicant named in part 3 is not an inventor, or
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Description 9

Claim(s)

Abstract

Drawing (s) 5

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Priority documents

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Statement of inventorship and right to grant of a patent (Patents Form 7/77)

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Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature *William R. Cowan* Date 27 June 2002

12. Name and daytime telephone number of person to contact in the United Kingdom David R Cowan 01926 336111

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P707114GB DRAFT

## Blending Apparatus

This invention relates to blending apparatus and in particular, but not exclusively, to apparatus for blending food product within a container, to a container for such blending  
5 and to a method of operating the blending process.

It has been proposed to blend food product within a container when preparing, for example, milkshakes in which the blending elements are located within the container and are driven to cause the contents to be blended. Such apparatus is described in  
10 WO 99/21466.

A primary intention of such apparatus is to enable hygienic and efficient dispensing to take place and the container and associated blending elements may be disposable after use.  
15

An object of the present invention is to provide improved apparatus for blending and dispensing food product.

According to the invention, blending apparatus comprises a container having an  
20 opening through which product to be blended is introduced into the container, a lid to close the opening, a blending element mounted on the lid and directed downwards into the container when the lid is located thereon, drive means driveably engageable with the blending element to rotate the element and obtain a blending action on product in the container, mounting means on which an assembly of container, lid and blending  
25 element is arranged to be located during blending, the blending means being moveable between a receiving position and an operative position in which the assembly is inverted with the lid lowermost.

The mounting means may include a holder into which the container is inserted and the  
30 holder is rotatable between a receiving position and an operative position. In the operative position the container may be upright and inverted. In the receiving position

the container may be generally upright or inclined at an angle to the vertical with the lid directed upwardly.

5      Clamping means may be provided for holding the container in the holder during movement between the receiving and operative positions. Alternatively, the container is located within a seating, which may be tapered, which holds the container in place during inversion and operation.

10      The holder may be located within a housing with access into the housing through an opening. The drive means may be located in the base of the housing for connection to the blending element when in the inverted operative position. The drive means may be moveable vertically into driving engagement with the blending means after the assembly reaches the operative position.

15      The housing may also provide a microwave housing whereby product within the container may be heated by microwave radiation prior to, during or after a blending operation.

20      The invention also provides a container assembly for blending apparatus comprising a nestable container base, a lid to seal the upper opening of the base, and a blending element mounted on the lid for rotation relative thereto and extending into the container when assembled, the lid having an opening for receiving the blending element rotatably therein, the blending element including a shaft towards one end of which are carried blending blades and towards the other end of which are connection means for effecting  
25      driving connection with drive means, the shaft extending through the opening in the lid in use, the assembly being invertable in use to blend product in the container in the inverted position by operation of the blending element.

Preferably, the lid is nestable with other lids.

30

Conveniently, the shaft of the blending element is a force fit into the opening in the lid and the shaft surface provides a bearing surface to permit rotation of the blending

element relative to the lid. In practice, the shaft defines a shoulder which is a force fit through the opening and after entering

the shoulder prevents disengagement of the blending element.

5

There is also provided a method of blending product within a container comprising an assembly of container base, lid for sealing the upper opening of the base, and a blending element mounted for rotation relative to the lid, in which the container base is filled through an upper opening, the blending element is united with the lid to be rotatable relative thereto, the lid is placed over the upper opening of the base and is sealed thereto, the assembly containing the food product is located in a holder, the holder is rotated to invert the container so that the lid is directed downwardly and drive means is drivingly connected to the blending element and operated to blend product within the container.

15

The container may be sealed after filling by a diaphragm heat sealed over the upper opening giving a sterile seal. Preferably, the diaphragm is located over the lid and associated blending element. The seal is removed before blending or the drive member is forced through the seal.

20

Usually the product within the container is at a cold temperature when it is located in the holder. If required, the container with cold product is heated after location in the holder, conveniently by microwave means, to a temperature ready for consumption.

25 After filling the container with product, the product may be filled at ambient cold temperature, or the product filling temperature may be hot for transportation at ambient temperature, chilled or frozen to a blending location in which case the container is sterile. The product may be frozen or chilled after the container is filled and transported in a frozen or chilled state to the dispensing location. In the latter case, the product may  
30 be heated prior to a blending operation. Any later cooling of product is to the consumption temperature immediately prior to blending. Alternatively the product may be consumed warm or hot, and heating may be microwave means.

Further features of the invention will appear from the following description of an embodiment of an invention given by way of example only and with reference to the drawings, in which:

5

Fig. 1 is a diagrammatic vertical section through blending apparatus, in one position,

10

Fig. 2 is a view corresponding to Fig. 1 in another position,

Fig. 3 is a view corresponding to Figs. 1 and 2 in another position,

Fig. 4 is a view corresponding with Figs. 1 - 3 in a further position,

Fig. 5 is a vertical section through a container for use in the apparatus,

15

Fig. 6 is a perspective view of an assembled lid and blending element of the container of Fig. 5,

20

Fig. 7 is a further perspective view corresponding to Fig. 6, but from the opposite side,

Fig. 8 is a perspective view of the blending element from one side, and

25

Fig. 9 is a perspective view of the blending element of Fig. 8 from the other side.

30

Referring to the drawings, a container 10 shown in more detail in Figs. 5 - 8, comprises a base part 11, which is of tapered shape narrower at its closed end and having an opening at its other, wider end. The base 11 is therefore nestable with other bases so that a plurality of such bases occupy little space when nested together. The container 10 has a lid 12 which is shaped to be located over the wider end of the base 11 and has a circumferential lip 13 for this purpose and which may snap over the end of the container or be heat sealed thereto. Centrally of the lid 12 is formed an opening of

circular section arranged to admit a blending element 14 therethrough for rotation relative to the lid 12. Alternatively, the opening may be located off-centre providing a central location for injecting product such as flavouring, carbon dioxide etc. into the container.

5

The blending element 14 comprises a shaft portion 16 which has opposite ends, on one of which is formed blending blades 17. In the illustrated arrangement such blending blades 17 extending radially outwardly, having leading blending edges 18 and being angled at various angles to give an effective blending action but other blade arrangements may be used. At the other end of the shaft portion 16 is formed a shoulder 19.

10

15

Towards the opposite end of the blending element 16 is formed a shaped opening 20, arranged to receive drive means 34 whereby the blending element is rotatable about its axis.

The shaft 16 is stepped at 21 and has the shoulder 19 which sealingly engages the walls of the opening in the lid 12 when assembled thereto.

20

Assembly of the blending means 14 to the lid 12 is by inserting the shaft 16 upwardly through the lid opening with the shoulder 19 engaging as a push-fit so that the blending element 14 is rotatably mounted on the lid 12, the surfaces of the shaft portion 14 between the step 21 and shoulder 19 acting as bearing surfaces against the lid opening during rotation.

25

In use, the container base 11, after de-nesting from other container bases, is charged with product, usually on a filling line, the product usually being in liquid form and including the ingredients which are subsequently to be blended. The blending element 14 is assembled with the lid 12 by inserting the blending element as a push fit through the opening in the lid 12. Prior to this operation the lids 12 are de-nested from one another.

30



The assembled lid and blending element is then located over the upper opening in the base 11 to seal in the product within the container. In order to ensure that the lid 12 is sealingly united with the base 11, plastics sheet may be located around the lid and upper end of the base and the sheet (not shown) is shrunk by heat shrinking onto the assembly to provide a hygienic seal. Alternatively, the upper end of the container may be sealed by other means.

The filled container 10 is then ready for transportation but may be frozen to be transported in a refrigerated container and to give longer life to the product during transportation and storage. Alternatively, the product in the container is maintained at ambient temperature and, due to the sealed environment of the container, the filled container has a suitable shelf life and does not need to be defrosted. After filling, sealing and packing, the filled containers may be stored and transported to a dispensing location.

At the dispensing location is situated apparatus as shown in Figs 1 - 4 by which the product within the container is blended ready for consumption. Referring to Figs. 1 - 4 a filled container 10 is located in apparatus which includes a container holder 22, which is shaped according to the shape of the base 11 to receive the container. After location within the holder 22, the container 10 is clamped in position by clamping means (not shown) which clamps the upper end of the container and holds it in the holder 22. The holder 22 is, as shown, located in a position inclined to the vertical during location within a housing 23 having an opening 24 through which the container 10 is located, the opening 24 having a closure 25 moveable to admit the container 10 and closable over the opening 24 when the container is in position, and the upper end of the container being directed towards the opening. The clamping means not only holds the container in the holder but also the lid on the container during inversion and blending

When in position and clamped, the holder 22 and the container 10 are rotated about a horizontal axis 26 by means of a drive arrangement 27 which may include a linear drive providing a reciprocal movement of a shaft 28 which through linkages 29 and 30,

rotates the holder 22 through about 145° to an inverted position of the container, as shown in Fig. 3.

5 Located in the base of the housing 23, is a drive motor 33 which rotates about an upright axis and has at its upper end a drive shaft 34 arranged to be drivingly connected to the blending element 14 of each container by engagement with the opening 20 in the blending element 14.

10 As the container and holder reach the inverted position, the drive shaft 34 is in a retracted position in the base of a housing 23 and the blending element 14 is spaced from said base, as shown in Fig. 3. The drive motor 33 and its associated shaft 34 is then elevated vertically so that the shaft 34 drivingly engages the blending element 14. This is achieved by a drive motor 37, which may be a linear drive, having a drive shaft 38 and a cranked link 40 reciprocally moveable so that upon outward movement the  
15 motor 33 is raised into the chamber defined by the housing 23 into driving engagement with the drive element 14. Upon operation of the drive motor 37, the blending element 14 is rotated to blend the contents of the container 10. A reverse operation of the motor 27 after disengagement of the drive 34 rotates the holder 23 back into its initial positions so that the container 10 with its blended contents is removeable from the  
20 housing 23, ready for consumption. Consumption may be by removal of the lid 12 with its associated blending means 14 or by providing a portion of the lid 12 which is flangible and through which a straw may be admitted into the container. Alternatively, the lid may have an access arrangement by way of a flip open closure by which a hinged position of the lid is moved upwards to create an opening, which may be small (for  
25 straws) or large for drinking the product. As a further alternative, an opening may be sealed by an adhesive strip which is peeled off for opening.

The housing 23 permits the use of microwave radiation to heat the contents of the container 10 when it is in position within the housing 23. In this case, the housing 23  
30 provides a microwave housing into which microwave energy may be imparted to heat the contents of the container 10 to the desired temperature for the blending operation. Microwave operation may be provided by any convenient means suited to the size and

contents of the container 10 to provide the required amount of microwave energy to bring the contents up to the desired temperature. Suitable heating may be for a given duration assuming the temperature of the product admitted to the chamber 23 is known and the desired final temperature is also known. However, the temperature of the container upon admission may be detected so that this is taken into account in the duration of the heating process. If the contents of the container are not frozen but already at the desired consumption temperature, it may not be necessary to provide heating means within the housing 23, and the housing may be omitted.

As a further alternative the inversion arrangement provided by the motor 27 may be omitted and the user replaces the container 10 in an inverted position onto the drive for the blending element, with or without a housing 23 and with or without the heating arrangement described. If the container 10 is to be directly placed onto the drive 33, 34, a housing with microwave heating may still be provided so that heating takes place after the container is located in driving arrangement and after closing the housing. The container, lid and blending element components are selected for use within a microwave environment. The microwave heating components may be in a module mounted on the housing.

The arrangement provides ready means for dispensing from the containers whereby after blending, the product may be consumed from the container or the container emptied and the container and the associated blending means is disposed of. The container base may be of conventional beaker or mug construction.

The container may be used to ship the product after sealing the top with a heat sealed diaphragm, the whole batch being in sterile condition. The lid and associated blending element is not added to the container until the container reaches a blending and consumption location. At that location the seal is removed and an assembled lid and blending element are applied. Containers with seals and lids with blending elements can be stored at the consumption location. The containers may be left in a magazine in an upright condition so that the lower container is removeable and the next container is presented for use. The lid may be stored in a magazine for removal when required and

the lid may be applied with information, such as "sell by" date, as they are removed from the magazine.

5 Filled containers may have their seals removed in batches at the dispensing/blending location and the lids are then applied thereto and the assembled units stored ready for use in a refrigerator or freezer.

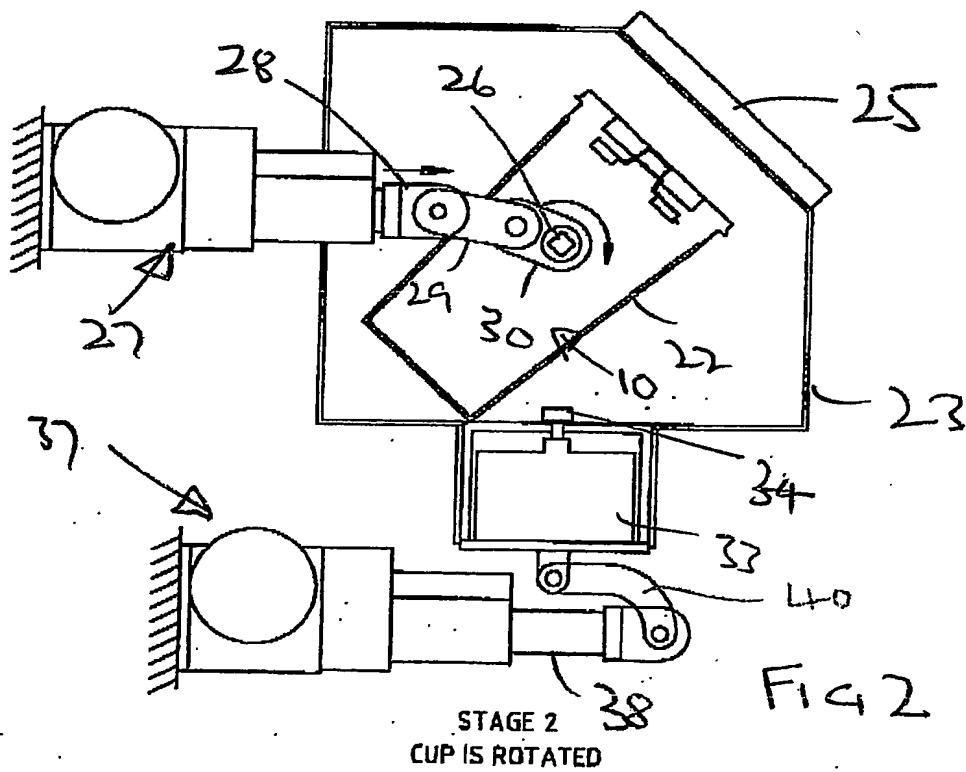
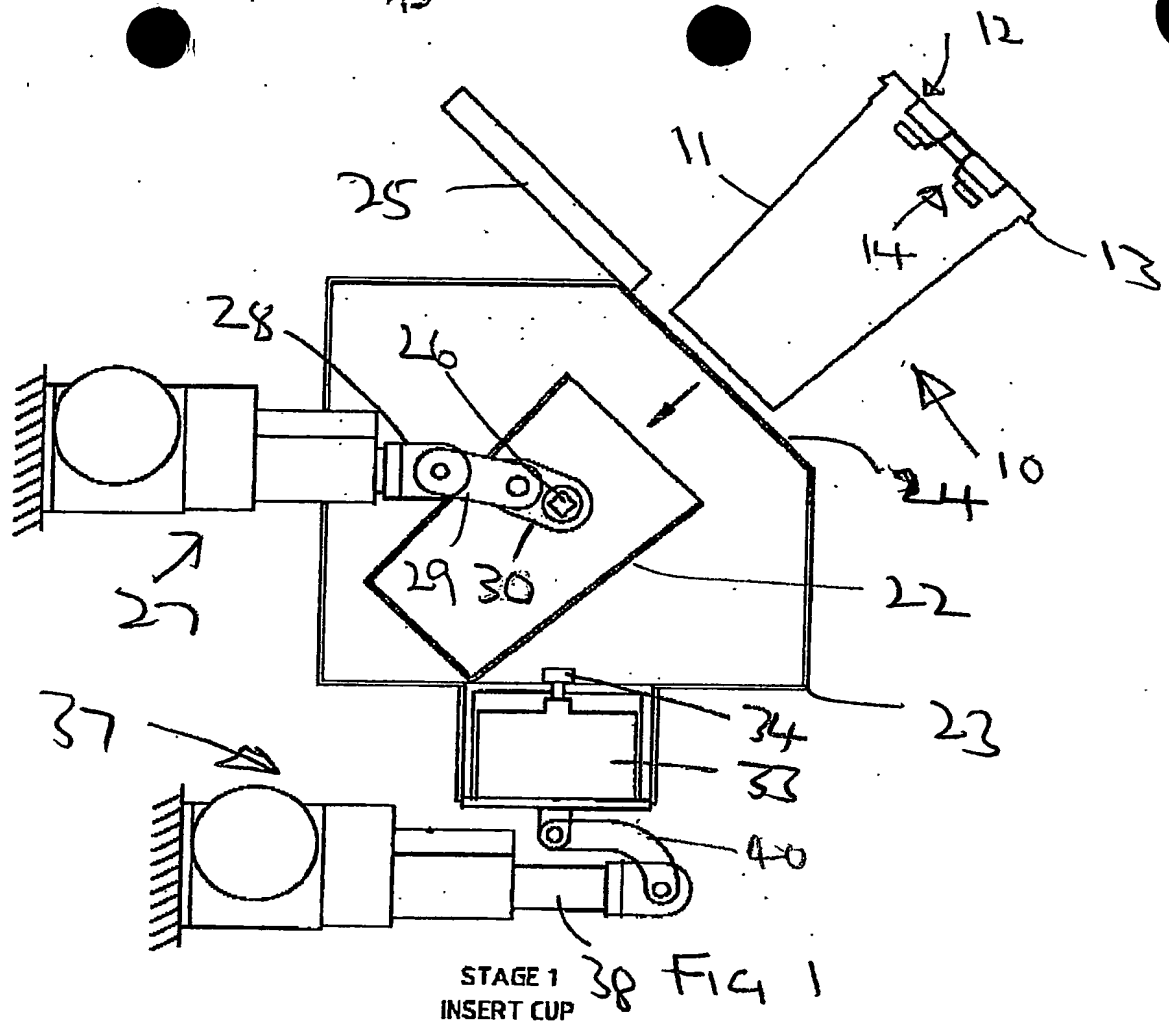
During the location of the containers in the holder ready for a blending operation, the containers may be shaken or vibrated and this assists the microwave heating process.

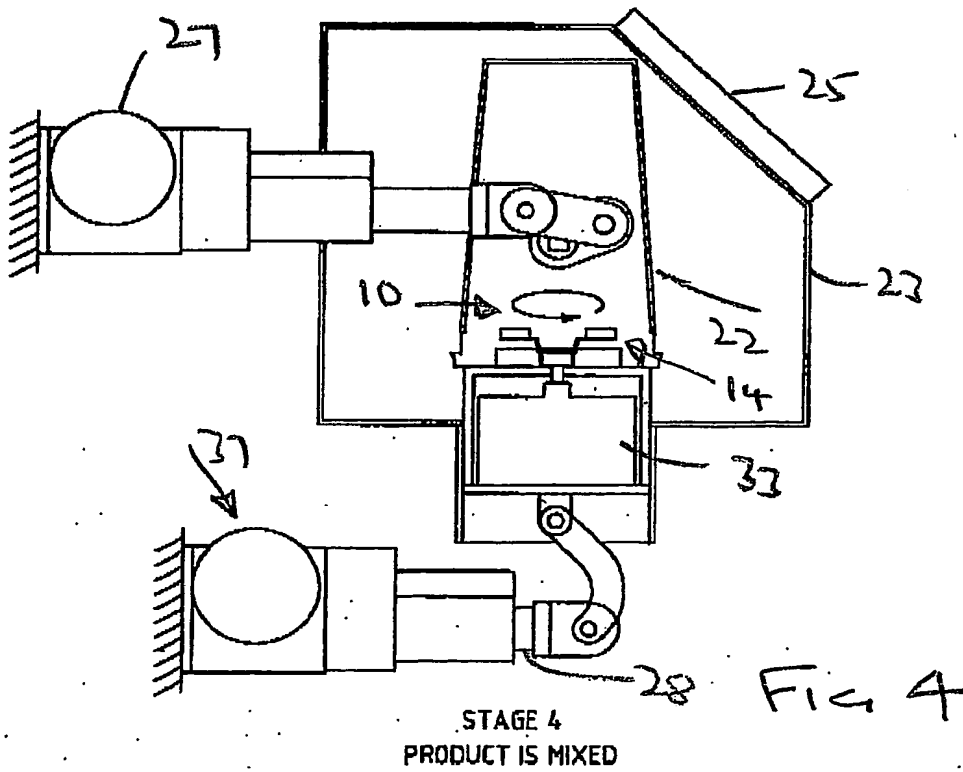
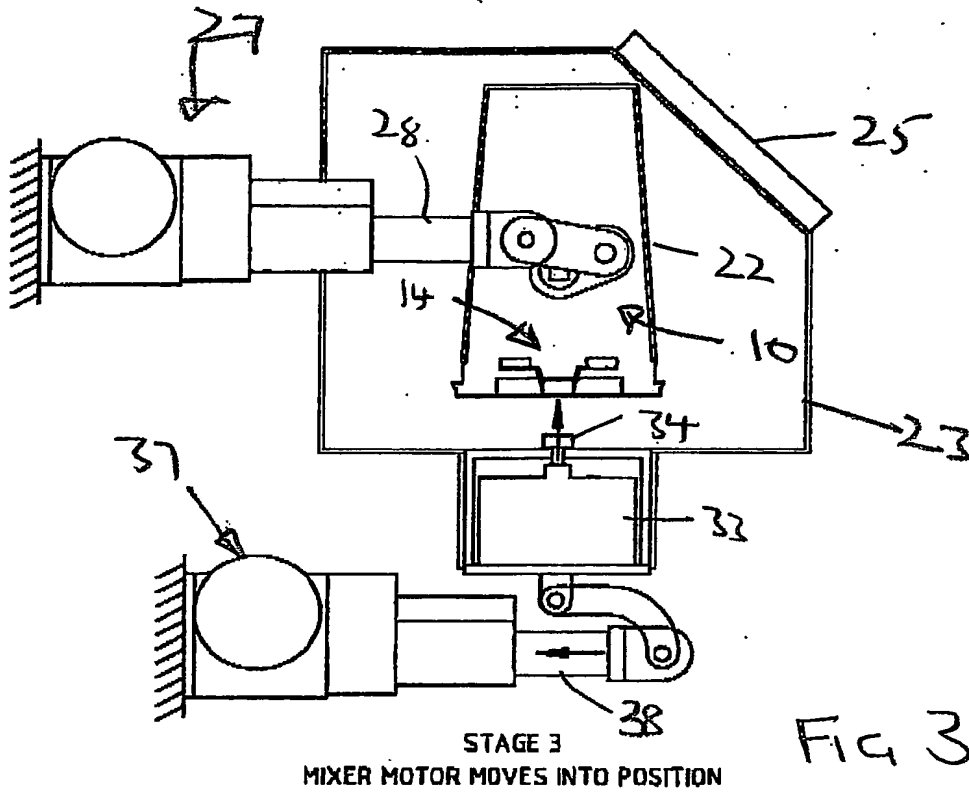
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Instead of the powered arrangement described by which the container is inverted for a blending operation, the inversion action may be manually operated and include a clamping action to clamp the container in a holder with a spring return and release mechanism.

15

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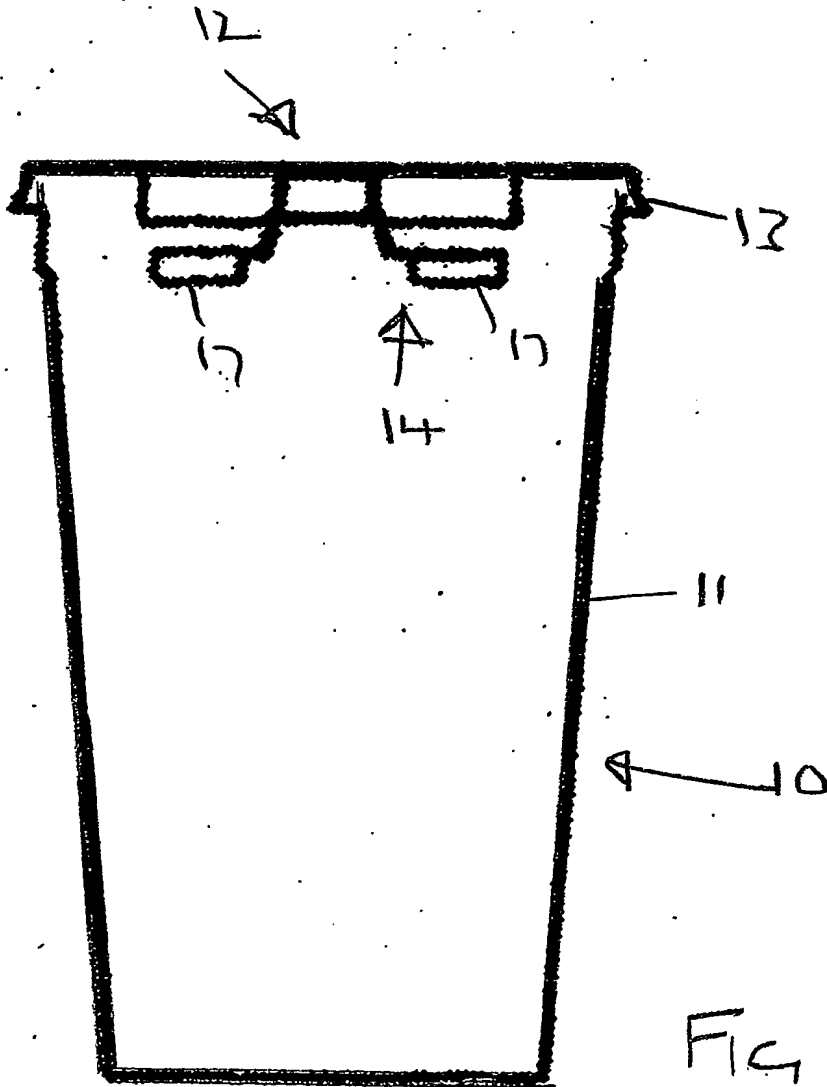


FIG 5

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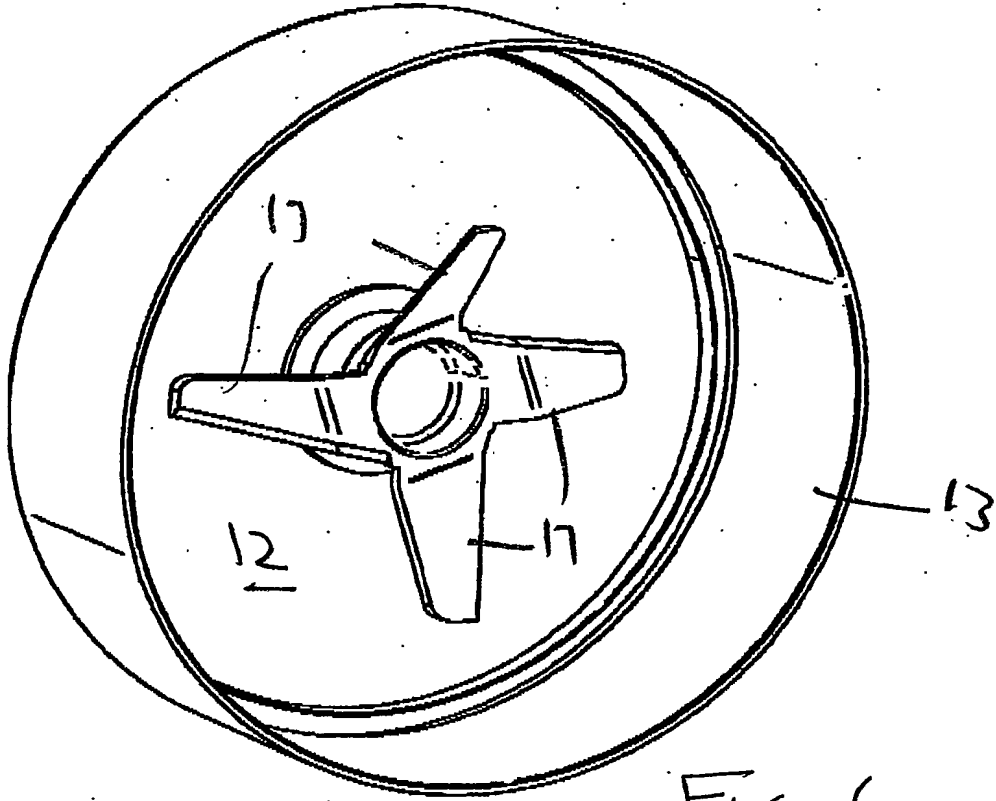


FIG 6

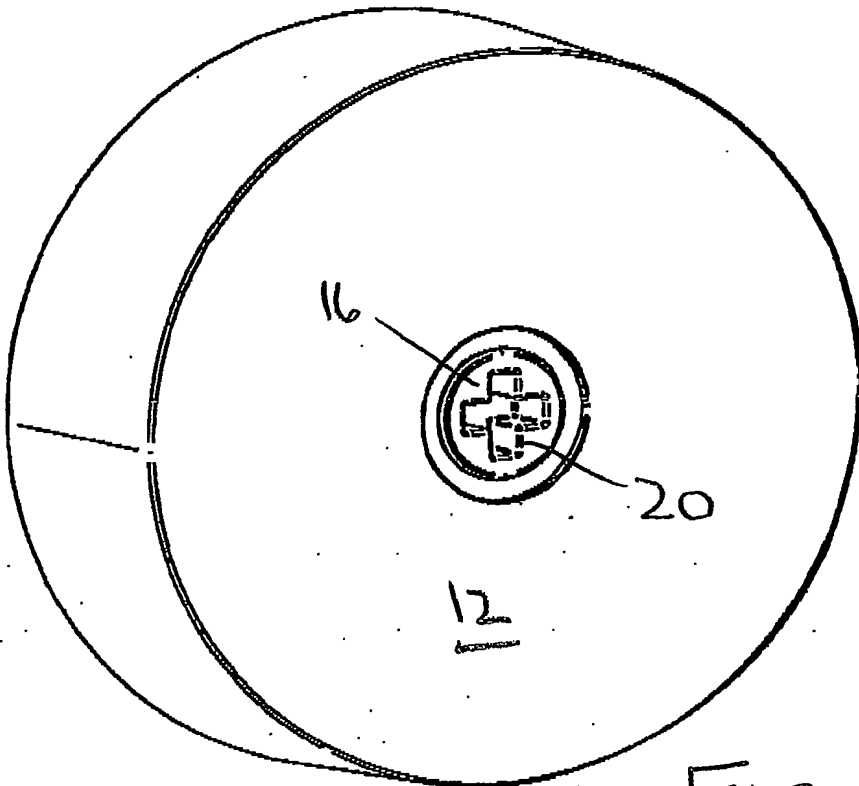


FIG 7



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Fig 9

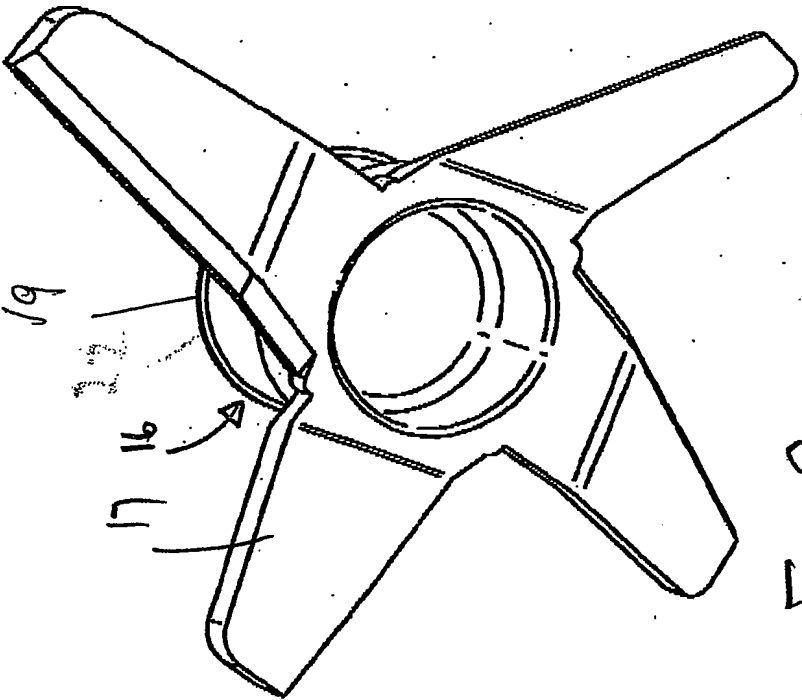


Fig 8

